

WHAT IS CLAIMED IS:

1. A polishing pad for polishing semiconductor wafers, comprising: a polishing layer having a transparent window portion; the transparent window portion being constructed of a wear resisting material with an inherent resistance to wear when subjected to abrasion during a polishing operation; the rate at which the window portion wears away during the polishing operation being increased to avoid forming a lump in the polishing layer, by having dispersed particles of at least one, or more than one, substance dispersed throughout the window portion; and the particles providing discontinuities in the wear resisting material, which are susceptible to wear when subjected to abrasion during the polishing operation.

2. The polishing pad as recited in claim 1 wherein, the dispersed particles are pieces of solid matter having a lower resistance to wear than that of the wear resisting material.

3. The polishing pad as recited in claim 1 wherein, the dispersed particles are pieces of solid matter that are susceptible to being snagged and worn away when subjected to abrasion during the polishing operation.

4. The polishing pad as recited in claim 1 wherein, the dispersed particles are cells of entrapped fluid within the wear resisting material; and the cells are susceptible to being snagged and worn away when subjected to abrasion during the polishing operation.

5. The polishing pad as recited in claim 4 wherein, the entrapped fluid is air.

6. The polishing pad as recited in claim 4 wherein, the entrapped fluid is deionized water.

7. The polishing pad as recited in claim 4 wherein, the cells are in the form of bubbles containing the entrapped fluid.

25 8. The polishing pad as recited in claim 1 wherein, the wear rate of the window portion is adjusted to be greater than that of the remainder of the polishing layer, which reduces a force exerted normal to the window portion as the window portion wears away during the polishing operation.

30 9. The polishing pad as recited in claim 1 wherein, the wear rate of the window portion is adjusted to be substantially equal to that of the remainder of the polishing layer, which evenly distributes a force exerted normal to the polishing layer during the polishing operation.

10. A method of polishing a semiconductor wafer with a polishing pad having a polishing layer with a transparent window portion, comprising the steps of:

providing dispersed particles of at least one, or more than one, substance dispersed throughout the window portion to increase the rate at which the window portion wears

5 away during a polishing operation and to avoid forming a lump in the polishing layer, and

polishing the semiconductor wafer with the polishing layer having the transparent window portion, and the particles providing discontinuities in the wear resisting material, which are susceptible to wear when subjected to abrasion during the polishing operation, without the window portion forming a lump in the polishing layer.

10 11. The method as recited in claim 10 wherein, the step of providing the dispersed particles, further includes the step of: providing the dispersed particles as pieces of solid matter having a lower resistance to wear than that of the wear resisting material.

15 12. The method as recited in claim 10 wherein, the step of providing the dispersed particles, further includes the step of: providing the dispersed particles as pieces of solid matter that are susceptible to being snagged and worn away when subjected to abrasion during the polishing operation.

20 13. The method as recited in claim 10 wherein, the step of providing the dispersed particles, further includes the step of: providing the dispersed particles as cells of entrapped fluid; and the nanometer sized cells are susceptible to being snagged and worn away when subjected to abrasion during the polishing operation.

14. The method as recited in claim 10 wherein, the step of providing the dispersed particles, further includes the step of: providing the dispersed particles as cells of entrapped air.

25 15. The method as recited in claim 10 wherein, the step of providing the dispersed particles, further includes the step of: providing the dispersed particles as cells of deionized water.

16. A method of making a window portion of a polishing pad, comprising the steps of:

30 providing a transparent window portion of a polishing layer with dispersed particles of at least one, or more than one, substance to increase the rate at which the window portion wears away during a polishing operation and to avoid forming a lump in the polishing layer.

17. A polishing pad useful for polishing integrated circuit wafers, comprising: a polishing surface and a transparent window portion disposed in an opening in the polishing surface, wherein the window portion has a wear rate equal to or greater than that of the polishing surface.

5 18. A pad according to Claim 17, wherein the window portion is comprised of a polyurethane having a wear rate of from 5 to 25% greater than the wear rate of the polishing surface.

10 19. A pad according to Claim 17, wherein the window portion is comprised of polymethylmethacrylate or polycarbonate.

10 20. A pad according to Claim 17, wherein the window portion comprises a discontinuity selected from solid particles, fluids and gases.

15 21. A pad according to Claim 17, wherein the window portion comprises a polyurethane and a discontinuity selected from solid particles, fluids and gases.

22. A pad according to Claim 21, wherein the discontinuity is a plastic particle.

15 23. A pad according to Claim 22, wherein the diameter of the particle is from 10-20 μ m.

24. A pad according to Claim 21, wherein the window portion comprises from 1 to 10% by weight of the particles.

20 25. A pad according to Claim 21, wherein the window portion comprises polyurethane and the plastic particle is polyurethane.

26. A pad according to Claim 21, wherein the discontinuity is a fluid.

27. A pad according to Claim 26, wherein the fluid comprises from 1 to 10% by weight of the window portion.

28. A pad according to Claim 26, wherein the fluid is a hydrocarbon oil.

25 27. A pad according to Claim 26, wherein the fluid is mineral oil.

27. A pad according to Claim 21, wherein the discontinuity is a gas.

28. A pad according to Claim 27, wherein the gas is carbon dioxide, nitrogen, or air and the gas comprises 85 to 99% of the volume of the window portion.

29. A pad according to Claim 17, wherein the transparent window portion

30 comprises: a silica aerogel.

30. A pad according to Claim 29, wherein the silica aerogel is prepared from tetramethyl orthosilicate or tetraethyl orthosilicate.

31. A pad according to Claim 21, wherein the discontinuity is an immiscible polymer system.

32. A pad according to Claim 31, wherein the immiscible polymer system is polyurea/polyurethane or nitrocellulose/acrylic.